

Taxing Issues with Privatization

A Checklist

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The literature on privatization has overlooked how the tax status of the company to be privatized will affect the firm's, and the country's, financial transition.



Summary findings

Privatization has been a popular strategy for improving efficiency in both market and transition economies. The literature on privatization includes broad discussions of pricing techniques but overlooks tax issues.

In reality, a state-owned company loses its privilege of paying no taxes once it is privatized. This change in tax status would certainly complicate the financial transition of a newly privatized company, affect industrywide economic efficiency, and change the revenue pattern of governments.

Using Ontario Hydro and the Canadian tax regime as examples, Mintz, Chen, and Zorotheos provide policymakers with a checklist on tax issues under privatization. Their main observations:

- The tax status of the company to be privatized must be considered in analyzing the firm's financial transition.

- The economic efficiency targeted by privatization may depend partly on the tax regime for a particular industry.

- Privatization affects government revenue through the revenue-sharing structure determined by intergovernmental fiscal relationships and cross-border tax arrangements.

Time is a factor in tax and transition issues. At the time of privatization, for example, how are assets to be valued for calculating capital gains and cost deductions, for tax purposes? Are the assets transferred to the new owners at fair market value, book value, or at cost, for tax purposes? How should heavy debt loads be treated?

Ontario Hydro will not be privatized but it will become taxable. How the taxes will be paid will depend on how the transition is treated. Tax policy will be a key determinant of the industry's future development.

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TAXING ISSUES WITH PRIVATIZATION: A CHECKLIST

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I. INTRODUCTION

In the past two decades, many governments have privatized their state-owned companies in the interest of improving the efficiency of these companies that are able to operate commercially. When a price is struck to determine the value of the company being sold in the market, the value will depend on the after-tax profits earned after the company is privatized. Amongst many factors that influence the price at which the company is sold, an important variable to determine is the tax burden of the company. If sellers and buyers overestimate the amount of taxes to be paid after the privatization, the price at which the company sold will be too low. The converse will hold when the taxes are underestimated. Thus, it is very important for governments and investors to know the prevailing tax regime affecting the company after privatization.

Usually, a state-owned company is not responsible to pay company taxes and certain indirect taxes, such as capital and property taxes. When the company is privatized, the company must then be subject to new forms of taxes that were previously not levied on the state-owned firm. Specifically, three types of issues arise when state-owned companies are privatized and become taxable:

- ***Transition issues:*** Many aspects of the tax base are related to “time”: for example, under the income tax, carryovers for losses and tax credits, deductions for depreciation and cost of borrowing, and capital gains treatment. At the time of privatization, how are assets to be valued for the calculation of capital gains and cost deductions for tax purposes? Are the assets transferred to the new owners at fair market value, book value or its cost for tax purposes? How should the treatment of the often extraordinarily high debt load carried on by the to-be-

privatized company be valued for tax purpose? The determination of the transfer value of assets may depend on the law of the country. In some cases, there may be no law at all since tax authorities never dealt with the issue prior to the time when privatization were being considered. Yet, the amount of tax payable by the shareholders after the firm is privatized can be affected substantially by the tax policies applied at the time of transition.

- ***Economic Efficiency Issues:*** Privatization is usually undertaken to improve economic efficiency by “leveling the playing field” among producers, especially if the state-owned company is in competition with domestic or foreign investor-owned companies. Such competition between state-owned and investor-owned producers is found in many countries, especially in utility, banking, transportation and communication, trade and resource industries. Prior to a privatization, it is quite common that tax policies evolve in such a way to offset the advantage that untaxed state-owned companies have in competition with taxable investor-owned companies. If a company is to be privatized, how would tax policy be applied on the new entity compared to its competitors? Will the tax policies affecting the industry need to be revised in light of the privatization? For example, if governments gave concessions to small-scaled investor-owned power producers competing with large-scaled state-owned power companies, should the tax treatment of both the new privatized and existing private producers be adjusted to remove previous tax incentives defined by the production scale or other features? Or should the new state-owned company be given the same tax benefits as existing producers? Consequently, the amount of taxes paid by the newly privatized firm can be significantly affected by evolving changes to tax policies.

- ***Revenue Transfers for Governments:*** A state-owned company, whose profits accrue to the owning government (national, state/provincial or municipal governments), will possibly pay taxes directed to it and other governments after the privatization. Although the investors are indifferent as to which government they pay taxes, the government will certainly care about the revenues that they should receive after the privatization. Privatization may lead to a transfer of revenue from the selling government to other governments that obtain new sources of tax revenue from the privatized firm. In some cases, the selling government may seek alternative taxing manner after the privatization to make up for the potential revenue loss, which may or may not change after-tax profits received by the shareholders compared to that resulted from the statutory tax structure.

A more detailed discussion providing a checklist of tax issues for policymakers is provided in the following section. To illustrate the tax issues that are listed, we consider in the following sections the privatization of Ontario Hydro. Recently, the Ontario government, as its owner, considered privatizing Ontario Hydro but rejected the policy in favour of a major restructuring of the industry in which Ontario Hydro would have to compete with investor-owned producers in both the generation and distribution of electrical power. The province is also requiring Ontario Hydro to pay taxes to the Ontario government as if it were a privatized company. Thus, many of the tax issues arising from privatization apply to the Ontario Hydro case as well.

Surprisingly, very little has been written about the tax treatment of new privatized companies. Most of the privatization literature, for example as illustrated by Vickers and

Yarrow [1988] and Newbery and Green [1996], provide a detailed discussion about the economic performance of the privatized companies, including valuation issues. Tax issues are rarely discussed and often treated in a simplified way.¹ Taxes are viewed as a simple proportional reduction in profits at the company level and dividends and capital gains/losses at the personal level. The purpose of this paper is to rectify the limited treatment of tax issues by providing policy makers a checklist of tax issues that are related to privatization.

II. A CHECKLIST OF TAXING ISSUES WITH PRIVATIZATION

Suppose a government decides to privatize an existing company. To keep our discussion as simple as possible, investors and the government use a common discount rate to determine the present value of income earned by the firm over time. To estimate the appropriate value at which shares are sold, the seller and purchasers must estimate the value of the firm. Let V_g be the transaction value of the shares for the government and $V_p - T$, be the value of the firm to the purchasers, gross of the transaction value paid to the government with T denoting the present value of risky taxes to be paid by the privatized company. The government is willing to sell the firm if

$$V_g + T \geq v^*, \quad (1)$$

v^* denoting the value of the firm as a state-owned company to the government, i.e., the value would accrued to the government if there is no privatization. The investors are willing to buy the firm if

$$V_p - T - V_g \geq 0, \text{ or } V_p \geq T + V_g \quad (2)$$

Combining equations (1) and (2) entails $V_p \geq v^*$. This implies that the privatization will take place if the privatized value of the firm for the investors, gross of taxes and the transaction

¹ After undertaking a literature search, we found very few papers on tax issues related to privatization. One

price for shares, is at least as great as the value of the firm to the government if it were not privatized. Taxes therefore result in a redistribution of revenues from the private investors to the government. Given that V_p is constant, the greater the amount of taxes paid by the firm, the lower the transaction price V_g as seen from equation (2).

Therefore, taxes play an important role in determining how revenues are split between the government and investors. Any over- (under-) estimation of taxes would result in the transaction price (V_g) being under- (over-) estimated. Thus, it is important for both tax authorities and the investors to understand how taxes will be applied after the firm is privatized.

The amount of taxes to be paid by the firm after the privatization will depend on three sets of issues, as discussed in the introduction. The first is related to transition issues – the amount of tax paid after privatization will depend on the valuation of assets and liabilities at the time of the privatization. The second is related to efficiency issues that can affect economic performance of the industry since the privatized firm competes with other producers. The third is related to the transfer of revenue from one government to another as a result of privatization.

1. Transition Issues

At the time of privatization, the assets and liabilities of the company are assessed not only in terms of their fair market value but also in terms of tax values that are used to assess tax liabilities after the privatization. There are a host of issues that need to be considered by tax authorities and investors in determining the amount of taxes to be paid overtime. Below, we provide a list of transition issues, which is not exhaustive.

paper that was found was Sinclair [1988] that reviewed income tax aspects of privatization in Canada.

- *Valuation of Tangible and Intangible Assets*: Normally, under corporate income tax rules of a country, the transfer of assets from the old to new owners as a result of a merger of investor-owned companies – including fixed assets, inventory, goodwill and depletable assets – are transacted in a range between the fair market value and the tax-determined cost of the asset. Depreciation of assets is based on tax rules for calculating capital cost allowances, not book depreciation. If the fair market value of assets is used and there is a capital gain, the seller pays taxes on capital gains on the difference between the sale price and the original cost of the asset and income tax on recaptured depreciation.² If there is a capital loss, the seller may be able to apply the capital losses against capital gains of other years through carryover provisions. The purchaser, whose assets are valued at the fair market value, is able to claim depreciation deductions and other cost deductions at the bumped up (down) value of assets. If an explicit rollover³ is provided, the assets may be transferred at the undepreciated cost that allows the seller to defer capital gains taxes. On the other hand, the purchaser is required to use the undepreciated cost of assets to value the assets. Investors may be able to elect whether to transfer the assets at a price no greater than fair market value and no less than the undepreciated cost base of assets. If capital gains taxes paid by the seller are greater than the present value of tax writeoffs for

² Recaptured depreciation is either the difference between the smallest of the original or disposition value and the undepreciated capital cost of the asset.

³ The general rule under the Canadian Income Tax Act is that a capital gain or loss must be recognized for tax purposes in the year it is realized by the taxpayer. However, in certain circumstances where a taxpayer's economic interest in a capital property remain unchanged, a deferral of any capital gain is permitted until the time of disposal of the property received in exchange. The permission for such a deferral is commonly called a "rollover". The Act provides an elective provision under which a taxpayer may dispose of eligible property to a taxable Canadian corporation without the immediate income tax consequences that would ordinarily result from the disposition. The general purpose of the provision is to permit a disposition of eligible property to a taxable Canadian corporation on a rollover basis. That is, in a manner whereby the disposing party avoids some or all of the tax that would otherwise arise on disposition and the corporation inherits this as a potential liability. The center piece of this provision is a joint election by the disposing party and the corporation in which they elect an amount that will be deemed to be the disposing party's proceeds of disposition and the corporation's cost of the property. For details, refer to CCH, Canadian Master Tax Guide.

the buyer, then it may be advantageous both to the seller and purchaser to elect the rollover treatment that would provide a tax-free exchange of assets.

The valuation of assets upon change of control would impact on the amount of taxes to be paid after a company is privatized. The government, as the original owner, will not be paying capital gains taxes. Therefore, it is to the purchaser's tax advantage to value assets at prices that would be at their highest value when the assets are transferred to the new owners. If the company has been successful, the fair market value is likely greater than the cost basis of the assets. The purchaser would prefer the assets to be bumped up to the fair market value. However, should the fair market value be below the tax-determined cost of the assets, it would be preferable for the buyer to have the cost basis of the assets used so as to maximize depreciation deductions and minimize payments of any future capital gains taxes. When the transaction price for the sale of the company is determined, the valuation of the assets for tax purposes can have a significant impact on the taxes paid after privatization. To the extent that the rule is known beforehand, the purchaser would reduce its offer price for the company if assets were transferred at the lowest price for tax purposes. The government would be willing to accept a lower offer price so long as it received the expected taxes that is gained from higher capital gains taxes and reduced cost deductions for depreciation and other purposes.

- *Carryforwards of losses and deductions*⁴: When companies incur losses for income tax purposes, they are able to carryforward the unused losses and deductions to be written off future taxable profits. When there is a change of control of a company involving two

⁴ Similar issues arise with minimum taxes which are used in a number of developing countries. A company may be required to pay a presumptive tax that is credited against the corporate income tax. If the corporate

taxpayers, the purchaser may use unused tax losses carried forward from earlier years under certain restricted conditions. For example, losses accumulated prior to the sale of the company may be only applied against the income earned from assets used in a continuing and similar line of business. Otherwise, losses may be extinguished upon change of control.⁵ However, when the government privatizes a company, the company may not have been paying taxes in the past. There are no carryforwards of unused losses and deductions unless parties agree to estimate such carryforwards and permit a transfer of deductions. Again, the amount of taxes to be paid by the privatized firm will depend on how carryforwards are handled.

- *Forgiveness of Debt:* If a taxpayer is forgiven from repaying monies borrowed from creditors, the amount forgiven may be added to the income of the borrower or used to reduce capital losses or capital cost.⁶ The creditor is permitted to write off the bad debt from taxable income. When a state-owned company is privatized, there may be substantial amounts of “stranded debt” that is to be paid back to creditors. The government might assume the responsibility to repay the debt so that the new privatized company will not be crippled by high leverage. However, the transfer of the stranded debt to the government is a forgiveness of debt and could be viewed as assistance provided to the company. Such forgiven amounts could be used to reduce the cost basis of assets transferred to the privatized investor-owned company (thereby reducing tax depreciation deductions so to increase the income tax liability, and increasing capital gain liabilities on disposition of assets after the privatization). Alternatively, the forgiveness

income tax is less than the presumptive tax, the excess amount of presumptive tax is carried forward to later years to reduce corporate income taxes in later years. See Chen and Mintz [1993b].

⁵ The Canadian rule is that non-operating losses may be carried forward and applied against profits of a “similar” line of business. Unused capital losses carried forward are lost upon change of control.

⁶ For example, refer to Canadian Income Tax Act, Section 80.

of debt may be treated as taxable income received by the state-owned company prior to privatization, thereby reduce the debt ratio of assets to be transferred through privatization, which would result in a higher income tax liability compared to the original high leverage level. Clearly, the rule used for the treatment of forgiven debt can have a significant impact on taxes to be paid after the privatization.

- *Withholding taxes:* Dividends, interest, royalties and fees are subject to withholding tax when paid to non-residents. International tax treaties may reduce withholding tax rates and a government may exempt interest paid to non-residents holding public debt instruments.⁷ Thus, prior to the time of a privatization, interest paid by the state-owned company may be exempt from tax. Following privatization, the interest may now be subject to withholding tax. Non-resident lenders may charge greater interest on funds lent to the privatized company since the withholding tax may not be credited against taxes owing to their own governments. Higher interest rates on debt would therefore reduce the profitability of the privatized company. Should such interest become subject to non-resident withholding tax, it would be necessary to at least grandfather existing debt obligations from the withholding tax until the term of the loan is complete.
- *Capital and Property Taxes:* In many countries, businesses are responsible to pay property taxes on real estate values or a proxy for value and, in a few countries, be responsible for payment of taxes on their assets or capital.⁸ A state-owned company may be exempt from such taxes. Therefore, at the time of privatization, the tax basis of the assets may need to be determined. The assets could be valued according to their original

⁷ For example, Canada and the United States both exempt from withholding tax interest paid on debt obligations under the Canada-U.S. treaty.

⁸ A number of Latin American companies have capital taxes that are a form of minimum tax.

cost (net of book depreciation) or at fair market value. If fair market value is used, the privatized company will pay greater (lower) property or capital taxes if the fair market value is more (less) than the book value of assets.

- *Pension contributions:* In many countries, employers may contribute to pension plans on behalf of their employees. The tax treatment of pension earnings can vary significantly across countries resulting in different impacts. One such tax treatment, found in the United States and Canada, is the following. The pension contributions are deductible from taxable company profits like wages and salaries and placed into accounts for employees. The contributions are not treated as an immediate tax benefit for the employee since the employee would have been able to receive an equivalent tax deduction for individual contributions equal to the tax benefit. The contributions and accumulated income earned are withdrawn as pension payments and fully taxed in the hands of the employee.⁹ In principle, therefore, the company pension plan becomes a mechanism that allows employees to defer taxable wages to retirement years. It is also a savings instrument for the employee.

If the employer is a state-owned company that becomes privatized, an issue arises in regard to the tax treatment of pension contributions. The employer contributions were not deductible since the state-owned company was not taxable; yet, when the funds are withdrawn later, the employee is fully taxed on withdrawals of contributions and accumulated income. It may be argued that there is “unfairness” in that the contributions prior to the privatization did not provide tax savings even though the contributions are to be taxed upon withdrawal. Thus, contributions prior to the privatization should be deducted from the profits of the company after it is privatized. On the other hand, it may

be argued that no correction is needed. Since the employees are effectively given a taxable benefit that is fully offset by an equivalent contribution that they would make to the pension plan, then there is no need to provide special recognition of the employer contributions prior to the privatization. In general, the tax issues that arise will depend on the type of tax treatment afforded to pension earnings.

There are other potentially important transition issues related the conversion of state-owned into privatized investor-owned companies. The transition issue will depend on the existing tax law, which varies from country to country. The above examples serve to illustrate the complexities that are involved with assessing taxes on companies when they become privatized.

2. Economic efficiency issues

Taxation can have a significant impact on the performance of an economy. In particular, taxes may impede economic efficiency by distorting relative prices that operate as signals for consumers and producers as to how they should best allocate their scarce resources. Uneven tax burdens across industries and businesses will result in a misallocation of resources by encouraging producers to invest in relatively more favourably-taxed relative to less favourably-taxed activities. In certain situations, it may be appropriate to levy differential tax burdens on producers to correct for market failures such as those related to environmental damage or insufficient innovative activity. However, in many situations, differential tax burdens arise since governments may wish to provide assistance to specific firms for political reasons rather than for some specific economic policy objective.

While there may be economic arguments that certain types of products to be subject to differential taxes, it is unclear that, within an industry, businesses should face differential tax

⁹ In some countries, pensions may not be subject to tax.

burdens that can result in greatest degree of inefficiency. There are three aspects of the tax system that could lead to differential taxes:

- *Differential statutory tax rates*: Some companies may be taxed at a different statutory rates than others: foreign companies, private companies and smaller businesses.
- *Differential measures of income for the corporate income tax*: Some producers may be provided exemption or more generous cost deductions compared to other producers even though they be producing similar products. For example, a virgin material producer may have greater (or lower) tax depreciation writeoffs for capital compared to a producer of recyclable materials.
- *Other taxes*: Some producers may be subject to taxes and levies that do not apply to others. For example, capital or financial transaction taxes may apply on banks but near-banks and non-financial organizations conducting some financial activities may be exempt from such taxes.

When a state-owned company is exempt from payment of certain taxes, it will have a competitive advantage over investor-owned producers. One of the objectives of privatization is to put all producers on a “level-playing field”. But would the playing field be “level” after the privatization? Often tax policy develops overtime that results in special concessions given to investor-owned companies so that they may compete better with state-owned companies, including lower statutory tax rates, faster writeoffs for capital costs and investment tax credits. If the state-owned company is to be privatized, what will be the prevailing tax system? Should the privatized company be given similar tax relief or should the competitors now face higher levels of taxation?

When privatization occurs, the government may be interested in not only leveling the playing field among producers within an industry but also across industries. If the objective is to eliminate as many distortions as possible, the government may wish to change tax rules that would affect the whole industry, not just the privatized company. The value of the privatized company will depend on the differential tax burden between it and its competitors.

3. Revenue Impacts

The third set of issues deals with revenue impacts of a privatization. As discussed above, a government receives two forms of revenue – a cash consideration for the sale of the privatized firms shares or assets and taxes paid by the privatized firm over time. The actual amount of taxes paid will depend on settlement of the aforementioned transition and tax policy issues but there are other considerations as well. These considerations are at two levels:

- *Other levels of government:* A state-owned company may be owned by a single government only. Thus, the proceeds from the sale of the enterprise will accrue to the government as owner of the company. However, when the company is privatized, taxes may accrue to other levels of government. For example, federal and state/provincial governments may both share the corporate income tax (as in Brazil and Argentina) and municipal governments may have access to the property tax, which was not paid by state-owned governments. Should a company be privatized, the owning government may desire a larger transaction price for the assets or shares of the state-owned company to make up for the loss of revenue paid to other governments. The investors, however, will not be willing to pay for a higher transaction price for shares or assets even though the tax burden may be reduced through a higher cost basis that can be deducted for tax purpose.

A privatization could therefore be blocked in the interest of maximizing the gains to the selling government.

- *Taxes paid to foreign governments:* When a state-owned company is privatized, some of the shares may be sold to foreign investors. Foreign governments, such as Japan, the United Kingdom and the United States, may permit their residents to credit withholding taxes against personal tax owing to the home government and, in the case of corporations, credit corporate income taxes paid abroad against corporate taxes payable at home. To the extent that the taxes paid by the privatized company are credited abroad, there is an effective transfer of revenue from the foreign to the host government. A host government may therefore be able to extract greater income taxes without affecting the offer price for the company since the investors are able to credit income taxes against foreign tax obligations. This will result in greater revenues accruing to the government selling the privatized company.

The fact that a government may have to share revenues with other governments played a very important role in determining whether a company should be privatized and if so, at what sell price. It was a significant factor in deciding whether the Province of Ontario should privatize its state-owned enterprise, Ontario Hydro. The above checklist of tax issues can thus be well-illustrated by the case of Ontario Hydro as to be discussed in the next section.

III. THE CASE OF ONTARIO HYDRO: BACKGROUND

During next few years, the Province of Ontario will introduce competition into its electricity industry, which has been characterized by Ontario Hydro's almost century-old monopoly.

The intensifying market competition has been the driving force to the government-initiated transition towards a competitive electricity system in Ontario. On the other hand, Ontario Hydro's unsatisfactory business record over the past decade has added to the pressure for reform. There has been province-wide criticism regarding the dramatic increases in power costs and the high wages and excess staff at Ontario Hydro. Many complaints have also surfaced with respect to Ontario Hydro's tax-exempt status, its function as a public policy instrument, its enormous accumulation of debt (over \$30 billion in 1997), and its lack of stringent market accountability. To focus on the taxing issues related to privatization, we will, in this section, first summarize Ontario Hydro's current tax status and the government's proposed the new system, and then review taxes that are to be paid by Ontario Hydro as if it is privatized.

1. Ontario Hydro's current tax status

As in most countries, state-owned corporations in Canada enjoy a tax-exempt status. As such, Ontario Hydro and municipal distributors do not pay corporate income or capital taxes at both federal and provincial level.¹⁰ Furthermore, according to the Power Corporation Act, the property of these companies is not subject to taxation for municipal or school purposes (except for local improvements). They are required to pay an amount to municipalities in lieu of property taxes; however, this amount may be less than what they would be required to pay as taxable corporations. Ontario Hydro is also required to pay a water rental fee to the province for its use of publicly-owned waters in operating hydroelectric generating stations, although it is uncertain if this payment reflects the full value of rents from using these resources. Thus, although reduced tax payments may allow for lower electricity rates in

¹⁰ According to the Canadian Constitution, federal and provincial governments do not have the right to tax each other. As such, the federal government does not have the authority to impose taxation on provincially owned corporations such as Ontario Hydro.

Ontario, any such reduction in price is essentially paid for by provincial and municipal taxpayers who forego taxes and rents for the use of their resources.

On the other hand, Ontario Hydro does pay federal and provincial payroll taxes (Canadian Pension Plan contributions, Employer Insurance premiums and Employer Health Tax payments). Nonetheless, Ontario Hydro has a lower tax burden compared to investor-owned counterparts.

Besides these regular taxes, Ontario Hydro pays to the provincial government a fee for the government's guarantee of debt repayment of Ontario Hydro equal to 0.5% of outstanding debt. This payment is not necessarily equivalent to the risk assumed by the province.¹¹

2. The New System

In light of the pressures for competition, Ontario has developed a plan to introduce both wholesale and retail competition in electricity in the year 2000. The Energy Competition Act was introduced in June of 1998 and, when enacted, will replace the Power Corporation Act. The Act outlines the new structure of Ontario's electricity market as well as the functions, powers, responsibilities and objectives of each unit in the new system. The new market will have Ontario Hydro reorganized into four separate entities: the Ontario Electricity Generation Corporation (OEGC), the Ontario Electric Services Corporation (OESC), the Independent Market Operator (IMO) and the Ontario Hydro Financial Corporation (OHFC).

Under this new system, Ontario Hydro's generation facilities will be transferred to a newly-incorporated OEGC while transmission, distribution and all other businesses of Ontario Hydro (primarily services) will be transferred to a newly-incorporated OESC. Since

¹¹ The spread in average yield between the government and corporate long-term bond was well above 0.5 percentage points over the period of 1996-98 (Bank of Canada Review). Given Ontario Hydro's leverage ratio,

transmission (or the 'wires' business) is by nature a monopoly, it will remain regulated but the OESC will be required to keep this business separate from its commercial or competitive activities through the appropriate establishment of subsidiaries. The new commercial electricity companies will be expected to earn a normal rate of return and make dividend payments to the Ontario government (the sole shareholder). Furthermore, the government will phase out its guarantee on their debt by the year 2000. In the meantime, the Ontario government proposes that Hydro would transfer a significant portion of its debt to the government as the "stranded debt" (the debt of the Financial Corporation that cannot reasonably be serviced and retired in a competitive electricity market). Besides these commercial electricity companies, the Independent Market Operator (IMO) will manage and coordinate the electricity market. It will run an electricity exchange, dispatch power based on least cost bids, arrange financial settlement between buyers and sellers, forecast supply requirements and encourage investment accordingly. According to the Act, the IMO will be an independent, non-profit corporation without share capital and will not be an agent of the Crown. On the other hand, Ontario Hydro Financial Corporation (OHFC) will retain and manage Ontario Hydro's debts and will be dissolved only when substantially all its debts and other liabilities have been retired. During its operation however, it will be required to pay municipal property taxes.

While Ontario Hydro has always been exempt from taxation, the enactment of the Energy Competition Act will require the OEGC and the OESC to make payments in lieu of federal and provincial corporate income and capital taxes. These amounts will be equal to the amounts that the corporations would be liable to pay if they were not tax exempt. Furthermore, municipal electricity distributors will be required to pay a prescribed percentage of their adjusted gross revenues as well as a transfer tax upon the transfer of property to

the guarantee seems far less than what would be the monetary value of risk assured by the provincial

anyone other than the OEGC, the OESC or another municipal electricity distributors. Finally, all these corporations will be required to make payments in lieu of additional municipal and school taxes (the difference between what the corporation currently pays and the amount it would be liable to pay according to an assessment prescribed by regulation).

All of the special payments just described are to be paid to the Financial Corporation for the purpose of paying down Ontario Hydro's stranded debt. After a date prescribed by regulation, these amounts will be payable to the province. Any debts that cannot be extinguished through these means is said to be "residual stranded debt" and will be serviced by a *competition transition charge* on both generators and consumers.

There are also other issues to be considered, for leveling the playing field in the industry, when Ontario Hydro be privatized and become taxable. These issues are mainly related to historical operating losses, the stranded debt and tax related expenses such as capital cost allowances.

3. Taxes that would be paid should Ontario Hydro be privatized

As mentioned, Ontario Hydro would pay the following taxes if it were privatized: federal and provincial corporate income taxes and capital taxes, municipal property taxes rather than grants in lieu of taxes and certain transaction taxes such as land transfer fees.¹²

Corporate Income Taxes. In Canada, the general corporate income tax rate is 29.12 percent at federal level, which includes a basic rate of 28 percent and a surtax of 4 percent. The provincial corporate income tax, which is imposed on virtually the same base, is not deductible from the federal tax. In Ontario, the corporate income tax rate is 15.5 percent. As

government.

¹² The water rental fees are ignored as we are unable to determine whether the amounts correspond to an appropriate charge for the use of water resources.

a result, a combined federal and Ontario corporate income tax rate of 44.6 percent would be applicable to the privatized Hydro.

The amount of corporate income tax paid depends on the elements of the tax base: both income and deductions for costs. Three quarters of capital gains from the disposal of assets is included in income. The costs of replacing fixed depreciable assets are written off according to income tax rules, based on declining balance methods except for a few minor classes.

According to its annual report, Hydro's main depreciable assets include hydraulic generating stations, fossil stations, nuclear stations with heavy water as the main component, transmission and distribution facilities, and administration and service facilities. Under the income tax act, the tax depreciation rate is 4 percent for all the electricity generating stations, 5 percent for heavy water, and 6 percent for transmission and distribution as well as administration and service facilities. Inventory costs are deducted according to First-in-First-out (FIFO) principles. Interest expense is deductible so long as the income is not exempted from taxation. Finally, Canada allows business losses to be carried forward seven years and backward three years.

Capital Taxes. There are capital taxes payable to both federal and provincial governments when Ontario Hydro becomes taxable. The federal government imposes a tax of 0.225 percent on taxable capital (shareholders' equity and reserves and debts, excluding accounts payable of less than 365 days, in excess of \$10 million), but this can be offset by the corporate income surtax of 4 percent. In Ontario, corporations with total assets and gross revenues of between \$1 million and \$2.3 million are taxed at a graduated rate. The general rate is 0.3 percent, which would apply to the taxable Ontario Hydro.

Property Taxes. In January 1997, the Ontario government introduced the Fair Municipal Finance Act, which established an assessment system based on current market value. Across the province, the property tax rate on industrial and commercial properties is about 2.5 percent of market value. It will be as high as 7.64 percent in the City of Toronto in three year's time. Ontario real property includes land, buildings, machinery, fixtures, and structures.¹³ Many of Hydro's fixed assets will be subject to the property tax.

Land Transfer Tax. Ontario levies land transfer taxes on land and attached buildings. With a progressive rate schedule, the general rate is 1.5 percent on transfer value above \$250,000.¹⁴ This tax could be applied to the transfer of property from the government to investors.

IV. AN ASSESSMENT OF THE TAX ISSUES

In this section, we will discuss, with Ontario Hydro as an illustrative case and following the checklist set out in Section I, the tax-related transition, economic efficiency and revenue issues arise from privatization.

1. Transitional Issues

As Ontario Hydro is to be taxed according to federal and provincial laws, a number of transition issues are raised, similar to a privatization. Depending on transitional arrangements with respect to the pricing of assets and liabilities, Ontario Hydro may pay quite different amounts of tax when it is assessed for corporate income and capital tax liabilities.

¹³ By statute, machinery and equipment used for manufacturing, farming, and mineral processing are also assessable but are not liable to property taxation.

¹⁴ These numbers were provided by officials of the Ontario Ministry of Finance and the City of Toronto's property tax division.

Pricing of Assets and Income Taxes: According to the Canadian Income Tax Act, provincial Crown corporations that are privatized are treated as if the firm just started up anew. Assets are valued according to fair market value prior to their transfer to the new entities. Unlike other restructuring of investor-owned companies (amalgamations, wind-ups of subsidiaries and acquisitions), no rollover treatment is provided that would allow a provincial Crown corporation to transfer assets at a cost basis of assets rather than their fair market value.

Given the current law, the pricing of fixed assets at fair market value rather than the tax value of the undepreciated capital cost, may be either advantageous or disadvantageous to Ontario Hydro. The recent mothballing of nuclear power plants had a significant impact in reducing Hydro's fair market value of assets below cost. Moreover, tax depreciation rates for utilities in the Canadian tax system are not all that generous. Thus, it is expected that the fair market value is likely less than the tax cost of assets. By transferring assets to new entities at fair market value, the value of assets for depreciation purposes are likely less than the cost basis, thereby increasing corporate income tax liabilities over time. On the other hand, the use of fair market value would depress values used for the assessment of capital and property taxes.

Treatment of historical losses: Normally, under Canadian law, when a company undergoes a change of control, accumulated non-capital losses for tax purposes may be transferred to the successor companies and applied against income for up to seven years earned from a similar line of business activity. Non-capital losses can also be carried back for three years. Net capital losses are extinguished with a change in control.

As Ontario Hydro is not undergoing a change of control (it is still owned by the government), one could argue that both historical non-capital and capital losses are transferable to the new taxable entities. However, when a provincial Crown corporation

becomes taxable, a further complication arises in that there have been no previous estimation of losses for tax purposes. Should such loss accounts be computed? Furthermore, as pointed out below, forgiven debt should be used to reduce any loss carryovers.

Restructuring capital financing and interest deductibility: Historically, Ontario Hydro's leverage has been over 90 percent of assets. This is not uncommon among state-owned enterprises since debt financing is guaranteed. An extremely high debt-asset ratio, without a government guarantee, would imply a much higher cost of capital for investors. With the recent financial difficulties of Ontario Hydro, the debt could be more than the fair market value of assets. Therefore, it became necessary for the government to "absorb" the "stranded" debt to bring Ontario Hydro's debt-asset ratio closer to a "private sector" ratio.¹⁵

As mentioned, the government will transfer the "stranded debt" to the Ontario Hydro Financial Corporation to bring down the generating and distribution capital financing structure to a commercially acceptable level. The stranded debt will be covered by tax payments made by Ontario Hydro and the competition transition charge on electricity used by consumers. Interestingly, should Ontario Hydro becomes taxable without the government absorbing the "stranded debt", it will take longer before it actually becomes liable for income taxes due to the tax deductibility for debt financing cost.

The transfer of debt from the new operating companies to the financial corporation has two important implications. First, it will allow the new companies to have a lower cost of funds since they will be perceived by the market to be less risky. Second, Ontario Hydro will clearly obtain a benefit from having its stranded debt forgiven. In principle, therefore, the value of debt forgiveness should be treated as income received that would be taxable or used to reduce accumulated tax losses transferred to the new entities, as discussed above.

Pension Contributions: As an employer, Ontario Hydro has contributed to the pension plans of its workers. Pensions will be paid from the contributions and accumulated pension plan earnings at a later time and subject to personal income taxation. Should Ontario Hydro therefore be allowed to capitalize the value of its contributions prior to the date that it becomes taxable so as to deduct such expenditures from corporate income tax liabilities owing at a later time? In principle, it seems inconsistent to allow for such pre-existing contributions to be capitalized and deducted. The payments are in lieu of salaries and wages, which were paid when Ontario Hydro was not taxable. It therefore seems that no particular deduction should be provided since the same argument can be made for any non-taxable employer that contributes to pension plans.¹⁶

Withholding Taxes on Interest: Interest payments made by Ontario Hydro to non-residents would be subject to tax, especially with respect to interest. However, most corporate bonds are of terms that are more than five years. Under current Canadian law, the interest paid to arms' length lenders for longer-term indebtedness is exempt from withholding tax. Thus, the effect of making Ontario taxable would not likely result in withholding taxes charged for interest payments to non-residents.

Other Issues: A few other issues will also apply to the tax treatment of Ontario Hydro. Some issues are very technical ones. For example, debt owned by the government is not subject to capital tax at the federal level. As the Ontario Hydro debt still remains with the Ontario

¹⁵ We understand that the expected debt-to-asset ratio for the generation company would be about 33% and the distribution company would be over 40%.

¹⁶ This issue arose with one recent privatization in Canada. The company was permitted to deduct the accumulated amount of contributions paid to employee pension plans prior to the privatization. This resulted in the virtual elimination of corporate income taxes paid by the company for a substantial amount of time.

government as financial holding company, it may be viewed that such debt should be exempt from capital tax. Other issues are related to future restructuring of Hydro. For example, companies can reduce taxes if interest or lease payments are made on a tax-free basis to trusts owned by pension plans. As another example, companies could be split between operating and managerial entities. The operating company pays fees to the managerial company and each owning manager can receive up to \$500,000 in tax-free capital gains on a lifetime basis so long as the company is a Canadian-controlled closely-held corporation. Should Ontario Hydro be able to exploit tax minimizing strategies to reduce payments made overtime?

In conclusion, a number of important transition issues are to be settled to determine the total amount of taxes to be paid by successor corporations to Ontario Hydro. To the extent that the issues are determined on a favourable basis for Ontario Hydro, then the Ontario government will receive less income to recover the cost of stranded debt or, once the stranded debt is paid off, as receipts for the Ontario treasury.

2. Implications for Economic Efficiency

As discussed above, taxes affect economic efficiency by distorting the allocation of resources in the economy. There are two forms of tax distortions that are particularly important: factor-use and competitiveness amongst producers. To evaluate the impact of the tax system on the use of resources, we compute the marginal effective tax rate. The marginal effective tax rate is the amount of corporate income, capital, and property taxes paid as a proportion of income earned on marginal investment projects. For example, if a company earns a 20% before-tax rate of return on capital and receives a 10% after-tax rate of return in capital, then the effective tax rate is 50%.

Factor-use Distortions: To illustrate the impact of taxability, Table 1 provides estimates of marginal effective tax rates on capital for two different cases: fully taxpaying case and tax loss case. The fully taxpaying case assumes that Ontario Hydro will generate taxable income under the proposed new system. The tax loss case is modeled as one particular situation whereby Ontario Hydro is able to carry forward its prior years' losses to shelter future income from corporate income taxation.¹⁷ Capital and property taxes are payable even though the company may not pay corporate income taxes until a later time.

Appendix A provides details of the model for calculating marginal effective tax rates. It is assumed that Ontario Hydro will be subject to corporate income, capital and property taxes according to the normal tax laws. It is also assumed that Ontario Hydro will have a commercially acceptable capital financing structure with a debt to assets ratio at about 33 per cent (generation) or 40 percent (transmission and distribution). If Ontario Hydro is able to carry forward losses from earlier years, it is assumed that it will take seven years to write off such losses.¹⁸

As shown in Table 1, there would be quite significant differences in effective tax rates on capital for particular assets. For the tax-paying case, machinery used for distribution bears the lowest effective tax rate (36%) while nuclear structure for generation would be subject to the highest effective tax rate (68% for the corresponding case). Structures tend to be highly taxed since they are provided a relatively low capital cost allowance (4% or 5% on declining balance basis) which is not altogether that much different than economic depreciation. Moreover, such assets are subject to relatively high property and capital taxes. Similar results hold for the non-tax paying case (Table 2).

¹⁷ There are other possible scenarios such as Ontario Hydro shifting from taxpaying to non-taxpaying states frequently. See Altshuler and Auerbach [1990] for further discussion.

¹⁸ This estimate is adopted from Chen and Mintz [1993b].

Making Ontario Hydro taxable will now distort its decisions to reduce nuclear power in favour of hydraulic power. The tax system will also encourage Hydro to substitute equipment for structures in production process. Thus, as a long run policy measure, the Ontario government may wish to change its policies to reduce disparities in effective tax rates on assets. In particular, municipal property taxes are quite high on commercial and industrial property – they therefore discourage the use of structures that are subject to such high rates of tax. Such changes in the tax system would have a significant impact on the amount of taxes to be paid overtime.

Competitiveness in the Industry: The tax system can distort competitive condition in an industry. Power is supplied by large provincial Crown corporations (hydraulic and nuclear) in competition with small producers (primarily small hydro and alternative fuels). Over the years, the tax system has provided for several tax incentives for independent power producers so that they may more effectively compete with state-owned firms. The most important incentive has been energy conservation equipment that at one time was written off over two years on a straight-line basis but now receives a 30% declining balance deduction, which is far more generous than the 4% to 6% declining balance deduction afforded to large producers. The assets that qualify for the more generous treatment include electrical generation, related transmission and interconnection equipment, assets used for fossil fuel projects, most structures and equipment associated with hydroelectric projects (up to 15 MW) and generating equipment using alternative power resources (e.g., wind and solar).

With the advent of improving competitiveness in the industry, the tax system, if remaining the same, could result in a distortion between the new Ontario Hydro entities and independent power producers (which are with smaller capacity and/or alternative power resources). As shown in Table 3, with the various cases, Ontario Hydro is subject to much

greater levels of tax compared to small producers, especially because of the more generous treatment of depreciation for capital cost allowances for smaller producers. Although the taxability of Ontario Hydro improves competitiveness in principle, a continuation of the existing corporate tax policies would provide much more favourable treatment for independent power producers.

One of the reasons for introducing competition for power supply in Ontario is to foster competition for Ontario Hydro in US markets. Table 3 also compares the effective tax rates faced by Ontario Hydro with US competitors. In this case, Ontario Hydro will face much higher effective tax rates on capital compared to producers from the United States. US producers face a lower corporate income tax rate, no capital tax and lower property taxes compared to public utility companies in Canada.¹⁹ Canada's tax system will put Ontario Hydro on a non-competitive footing with power producers from the United States.

In summary, we come to the following conclusions regarding the role of tax policy in terms of economic efficiency:

- (1) If Ontario Hydro is taxable, an important question is whether the fast writeoffs granted to independent power producers would also be available to Hydro. As noted above, under current law, conservation equipment is limited to small hydraulic projects and is unavailable for assets used to produce nuclear power. If Ontario Hydro is taxable under current law, it is clear that Ontario Hydro assets would not qualify for faster tax incentives provided to independent power producers unless there was a change to tax policy. However, if the fast writeoffs were available to large provincial Crown corporations, then there would be a significant amount of tax losses generated within the corporate income tax system as a whole. This would result in an unstable corporate tax

system since companies would try to transfer to other taxable entities that have taxable income to absorb tax losses.

- (2) Ontario Hydro's privatization is partly motivated by the deregulation of the electricity industry. However, an open-border electricity market implies that the privatized Ontario Hydro will have to compete with not only domestic firms but also major US electricity exporters along the border. As our estimates show, the US generators and distributors certainly possess tax advantages over a taxable Ontario Hydro if it is privatized.

3. Revenue Impacts

It is not possible for us to provide an estimate of the amount of taxes Ontario Hydro's new entities will pay to the Ontario government. It is clear that a number of transition issues would need to be considered and there is no data that would allow us to make such an estimate easily. However, if it is assumed that the current value of book profits and assets (excluding one-time changes) are the base for the amount of taxes to be paid, Ontario would pay about \$235 million in federal and provincial corporate and capital taxes and \$180 million in property taxes.

As part of its reform, the Ontario government rejected the option of privatizing Ontario Hydro. Prior to its election, the government proposed privatizing a number of provincial Crown corporations but decided not to proceed with the program. It seemed that the government had a rather large agenda for change in the province and was less willing to undertake privatization during its restructuring of government services. However, as a result of large losses incurred by Ontario Hydro with its nuclear program, the government undertook significant reform of the power industry but without the privatization of Ontario

¹⁹ See also the report of the Technical Committee on Business Taxation [1998] that showed that the effective tax rate on capital as well as costs of production is much higher in Canada compared to the United States.

Hydro. Arguably, a primary reason for not proceeding with privatization of Ontario Hydro was that a significant amount of tax revenue would be paid to the federal government.

The federal government would have received about 50% of revenues paid by Ontario Hydro should the privatization have gone through. By making Ontario Hydro taxable but still operate as a Crown corporation, the province would be able to keep the revenues within the province.

The province is also ensuring that property taxes would be paid to the province, not the municipalities. In Canada, the provinces have full control of municipalities that are "creatures" of the province. Under Section 86 of the new Act, both the generation and distribution subsidiaries and every municipal electrical utility will make payments to the financial corporation (holding the stranded debt) in lieu of taxes payable to municipalities and for school purposes.²⁰ It is likely that the grants paid to municipalities in lieu of property taxes would remain the same.

V. CONCLUSIONS

Many less developed countries have been privatizing their state-owned companies to improve the competitiveness of the electricity power markets. Taxation is rarely thought of during privatization exercises except to determine the offer price of the privatized company.

This paper illustrates that there are a number of significant tax issues faced by policymakers when applying tax law to newly-privatized companies. There are transition issues such as those related to the valuation of assets, carryover of loss deductions, employer pension contributions, withholding taxes and other taxes such as property taxes. There are economic efficiency issues related to taxation that may require adjustments to tax policies over time. These issues include tax distortions related to the use of factors in production and

competitiveness among domestic and foreign producers. Finally, there are issues related to the distribution of tax revenue, particularly with respect to payments made to other governments.

The case of Ontario Hydro serves to highlight a number of these above issues. Ontario Hydro will not be privatized but it will become taxable. The taxes to be paid will depend on how transition is to be treated. There will also be some significant pressures at a later time potentially resulting from much higher taxes paid by Ontario Hydro compared to independent power producers and US competitors. Tax policy will be a key determinant to the future development of the industry.

²⁰ This payment applies for land and buildings used for generating station buildings, and transforming and auxiliary equipment and machinery.

Table 1
Marginal Effective Tax Rate on Capital (in percent)
Ontario Hydro for Different Cases of Property and Capital Tax Liabilities

	Including All taxes	Excluding property tax	Excluding property and capital taxes
A. Generation			
<i>Hydraulic</i>	66.0	52.6	29.4
<i>Fossil</i>	67.6	55.7	36.0
<i>Nuclear</i>	68.2	56.7	38.2
<i>Heavy water</i>	63.5	49.7	26.7
<i>Buildings</i>	65.9	52.4	28.9
<i>Machinery & Equipment</i>	39.3	39.3	26.9
<i>Inventory</i>	42.1	42.1	39.9
Aggregate	67.1	55.2	36.0
B. Distribution			
<i>Transmission & distribution</i>	60.7	46.4	23.0
<i>Buildings</i>	64.7	50.0	23.6
<i>Machinery & Equipment</i>	35.6	35.6	21.6
Aggregate	60.2	46.1	23.0

Table 2
Marginal Effective Tax Rate on Capital (in percent)
Ontario Hydro for Different Cases of Risk and Use of Losses

	The Tax-paying Case	The Tax-loss Case
A. Generation		
<i>Hydraulic</i>	<i>66.0</i>	<i>62.5</i>
<i>Fossil</i>	<i>67.6</i>	<i>63.6</i>
<i>Nuclear</i>	<i>68.2</i>	<i>64.0</i>
<i>Heavy water</i>	<i>63.5</i>	<i>60.1</i>
<i>Buildings</i>	<i>65.9</i>	<i>62.5</i>
<i>Machinery & Equipment</i>	<i>39.3</i>	<i>44.5</i>
<i>Inventory</i>	<i>42.1</i>	<i>27.6</i>
Aggregate	67.1	63.0
B. Distribution		
<i>Transmission & distribution</i>	<i>60.7</i>	<i>57.3</i>
<i>Buildings</i>	<i>64.7</i>	<i>61.5</i>
<i>Machinery & Equipment</i>	<i>35.6</i>	<i>42.4</i>
Aggregate	60.2	57.0

Table 3
Marginal Effective Tax Rate on Capital (in percent)
*Comparing Ontario Hydro with Smaller Canadian
Producers and US Competitors*

	Ontario Hydro	Small Canadian Producers	US Competitors
A. Generation			
<i>Hydraulic</i>	66.0	-7.8	37.0
<i>Fossil</i>	67.6	-3.9	40.9
<i>Nuclear</i>	68.2	NA	42.3
<i>Heavy water</i>	63.5	NA	37.5
<i>Buildings</i>	65.9	33.8	36.7
<i>Machinery & Equipment</i>	39.3	29.5	8.3
<i>Inventory</i>	42.1	42.1	34.1
Aggregate	67.1	-2.4	40.9
B. Distribution			
<i>Transmission & distribution</i>	60.7	-12.5	25.7
<i>Buildings</i>	64.7	29.0	33.2
<i>Machinery & Equipment</i>	35.6	24.6	1.9
Aggregate	60.2	-9.9	25.1

APPENDIX A

Methodology on Estimate of Marginal Effective Tax Rate

This appendix provides formulas and explanations for METR calculation. The standard method used to estimate marginal effective tax rates has been extensively documented.²¹

The marginal effective tax rate on capital measures the impact of a tax system on an incremental capital investment. It incorporates the effects of not only investment-related statutory tax rates and other tax treatments (e.g. tax depreciation, tax credit, tax deductibility, tax holidays, etc.) but also various economic factors interacting with these tax treatments (e.g. financial costs, the inflation rate, and the structure of investment, etc.) In other words, the marginal effective tax rate is a summary indicator of the overall tax burden imposed by a tax system on a new investment in a certain economic environment. Numerically, it is a percentage expression of the difference between gross-of-tax rate of return on the capital and net-of-tax rate of return on capital divided by the net-of-tax rate of return on capital.

The following are general formulas used in this study.

1. Marginal effective tax rate (t)

As aforementioned, the marginal effective tax rate, t , on a given type of capital is defined as the proportional difference between the gross-of-tax rate of return (r^G) and the net-of-tax rate of return (r^N). That is

$$t = (r^G - r^N)/r^N \quad (1)$$

r^N is the weighted average of the return to debt and equity securities required by the financial investor. r^G is the difference between the marginal revenue product (or user cost, in equilibrium) and economic depreciation. As shown below, one of the main components of r^G is the real cost of financing, r^f .

2. The net-of-tax rate of return on capital (r^N)

The formula for net-of-tax rate of return, r^N , is

$$r^N = \beta i + (1 - \beta)\rho - \pi \quad (2)$$

This is the rate of return on capital required by suppliers of investment funds.

²¹ Formal derivations may be found in Boadway, Bruce, and Mintz [1984], and Mintz and Purvis [1986]. For tax-loss case, refer to Chen and Mintz [1993a].

3. The real cost of financing (r^f)

The real cost of financing (r^f) is defined by

$$r^f = \beta i(1 - U) + (1 - \beta)\rho - \pi \quad (3)$$

with β = debt to assets ratio, i = cost of debt, U = the statutory corporate income tax rate which indicates, in the formula, the interest deductibility for corporate income tax purpose, ρ = cost of equity, and π = inflation rate. That is, the cost of financing for a real capital investor is the weighted-average cost of financing net of inflation rate.

4. The gross-of-tax rate of return (r^G) on capital

a. Depreciable assets

$$r^G = (1+t_s)(r^f + \delta + h)(1 - k)[1 - A + \mathcal{G}(1-U)/(\alpha + r^f + \pi)]/(1-U) + tp - \delta - h \quad (4)$$

with t_s = tax on transfer of property, or sales tax on capital goods where is applicable, δ = economic depreciation rate, h = capital risk, k = investment tax credit rate, A = present tax value of the accumulated capital cost allowance = $U\alpha(1+r^f+\alpha)/(\alpha+r^f+\pi)$, α = tax depreciation rate, \mathcal{G} = capital tax rate, and tp = property tax rate.

b. Inventory

For inventory,

$$r^G = (1+t_s)(r^f + h + U\pi\xi)/(1-U) + \mathcal{G} - h \quad (5)$$

with t_s = sales tax on inventory where it is applicable, and $\xi = 1$ for FIFO accounting method and 0 for LIFO indicating that FIFO will result in a taxation on inflated profits when inflation rate (π) is greater than zero.

c. Land

For land,

$$r^G = (1+t_s)(r^f + h)[1 + \mathcal{G}(1-U)/(r^f + \pi)]/(1-U) + tp - h \quad (6)$$

with t_s = tax on transfer of property, particularly land.

5. Aggregation

The METR on capital, t_c , is the proportional difference between the weighted average of gross-of-tax rates of return and the net-of-tax rate of return on all types of assets. As the net-of-tax rate of return is the same across asset type within a given country, t_c can be calculated as

$$t_c = \sum_i w_i [(r_i^G - r_i^N)/r_i^N] = (\sum_i r_i^G w_i - r^N)/r^N \quad (7)$$

where i denotes asset type (i.e., buildings, machinery, inventories, and land in our case), w_i denotes the weight of asset type i .

The above are general format of formulas used for METR on capital. Due to the variance among different jurisdictions, some variables in the formulas can be zero for some jurisdictions. For example, in our case study, since sales taxes have little impact on capital goods and taxes on transfer of land are ignored, $t_s = 0$ in the above formulas.

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